IB BIOLOGY YEAR 1 SUMMER ASSIGNMENT INSTRUCTIONS

Please sign up for the class remind account- 81010 @C7a6gk4

IB Biology will be a very intensive course. Though we will have 90 minute periods every other day, there is still a lot of new material to learn. The only way we can do this is because you already have one year of background in Honors Biology.

This summer assignment is a review of the cells unit covered in Honors Biology and by having this topic fresh in your mind when you come into the IB class, will make it easier to move through the cells unit faster and more efficiently.

Answer all the questions in your best handwriting or (type). Use any websites or books for reference. Indicate in your assignment all the references you use for each topic. All answers requiring more space should be typed or written out. As IB students, you are expected to become quite independent and disciplined learners.

Class Supplies

6 section or more expanding file folder (see below)

Notecards/ index cards

Highlighters

Please don’t put off this assignment until the end of the summer. Space out the topics over time and the work will not seem so overwhelming. Some of the material may be new to you, but it is important that you find all of the answers. Everyone needs to have this assignment done by the first day of school. We will review it and there will be a test on it at the beginning of the second week of school. You will be expected to be familiar with the information in this assignment, as it will be used as a basis for our class and referred to at critical points during the class.

Looking forward to an awesome year in IB Biology!

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TOPIC I.
Cellular structure and organelles

Look for the definition and function of each of the cellular organelles below (this must be in your own words)

CYTOPLASM
NUCLEAR ENVELOPE
NUCLEUS
CELL WALL
NUCLEOLUS
RIBOSOME
ROUGH ENDOPLASMIC RETICULUM
SMOOTH ENDOPLASMIC RETICULUM
GOLGI APPARATUS
LYSOSOME
MITOCHONDRION
(pl. mitochondria)
VACUOLE
CHLOROPLAST
MICROFILAMENTS AND MICROTUBULES
PEROXISOMES
CELL MEMBRANE
Tour of the cell – \textit{Label the indicated structures in these diagrams of plant and animal cells}

\textbf{Plant Cell}

\hspace{2cm}

\textbf{Animal Cell – write the names next to the letters}
Compare plant and animal cells. Compare a plant and an animal cell by identifying the common parts and the unique parts to the plant cell.

(a) ..................................................  (g) ..................................................
(b) ..................................................
(c) ..................................................
(d) ..................................................
(e) ..................................................
(f) ..................................................

Add any missing parts of the cells, by drawing a line and labeling with the consecutive letters:

__________________________  ____________________________
__________________________  ____________________________
__________________________  ____________________________
__________________________  ____________________________
Topic II. Cell Membrane

Vocabulary – use the following words to describe the composition of a cell membrane (A) and how it works (B), in a couple of paragraphs in your own words:

A. Permeable – selectively (semi) permeable
   - Phospholipid bilayer
   - Proteins
   - Cholesterol
   - Carbohydrates
   - Hydrophilic – water loving -
   - Hydrophobic – water hating -

B. Concentration (mass per volume) –
   - Solution – solute, solvent, solubility
   - Concentration gradient
   - Hypertonic (“above strength” – high concentration)
   - Hypotonic (“below strength” – low concentration)
   - Isotonic (“same” – equal concentration on both sides)
   - Turgid Flaccid
   - Plasmolysis

Describe each of the following types of transport:

- Diffusion, Osmosis, Passive Transport, Active Transport
- Exocytosis, endocytosis, (phagocytosis, pinocytosis)

Cell membrane structure
The cell membrane organizes the chemical activities of the cell. It surrounds the cell and controls the traffic of molecules into or out of the cell. Some scientists consider it more important to the cell functioning than the nucleus.

The cell membrane is **selectively permeable** because ________________________________

The main structure of cell membranes is composed of ________________________________. Because of this, only molecules soluble in ___________________________, also called hydro____________________ molecules can pass through the membrane freely. On the other hand, hydro____________________ molecules depend on ___________________________ to cross the lipid bilayer. The most important to life of these latter molecules is ___________________________.

A **solution** is a ________________________________

Some examples of solutions are: ________________________________

A solution has two components, one that dissolves, called the ________________ and one that is the medium in which the other dissolves, called the ________________.

When a substance has the ability to dissolve in another to form a solution, it means that this first substance is _______ in the other.

The concentration of a solution could be defined as the ________________ of the ___________ per _____________ of _________________. Solutions can be concentrated or dilute, depending on how much solute is present.

How are these terms about solutions important to the study of cell membranes?

The following terms are extremely important to the understanding of the transport across cell membranes:

- **Hypertonic** solution (“above strength” – solution with _________________ concentration of solutes than on the other side of the membrane)
- **Hypotonic** solution (“below strength” – solution with _________________ concentration of solutes than on the other side of the membrane)
- **Isotonic** solution (“same strength” – solution with _________________ concentration of solutes on both sides of the membrane)
Transport across membranes

Some molecules cross membranes without using any energy and other molecules need cell energy to cross.

1). **Passive transport** is when substances cross the cell membrane _with / without_ energy, going freely from where they are _more / less_ concentrated to where they are _more / less_ concentrated. This can be observed in everyday life in the following examples:

1) _ _ _
2) _ _ _
3) _ _ _
4) _ _ _

**Passive Transport is also called** _____________. There are two types of diffusion, free and facilitated diffusion.

**Free diffusion** is the tendency of particles to spread from where they are _concentrated to where they are _concentrated, like in the examples above. This means molecules diffuse down concentration gradient until equilibrium is reached. Molecules continue to move back and forth in equilibrium without change in concentration. In cells only hydro _______________ molecules can diffuse freely through the cell membrane. Why?

**Facilitated diffusion** needs protein channels to help hydro _______________ molecules cross the phospholipid bilayer.

Transport proteins are embedded in the membrane and they act as pores for passage of particular solutes down their _________________.

The main molecule that crosses in this way is _______________, crucial to life.

The special type of facilitated diffusion that water uses to freely cross membranes is called _______________.

It is the water movement through a selectively permeable membrane from a “weak” solution, also called _______________ to a “strong” solution, or _______________ until equilibrium is reached, called _______________. This means that when the solute concentration outside the cell is higher than the one inside the cell, the water will move ___ into / out ___ the cell, making the cell ___ smaller / bigger ____. In this case water goes from a _________ tonic solution towards a _________ tonic solution until it reaches equilibrium and both side become _______ tonic.

On the other hand, when there is higher concentration inside the cell than the outside, the water will move from ___ inside / outside ___ of the cell towards the ___ inside / outside ___ of the cell. In scientific terms, water moves from a _________ tonic solution towards a _________ tonic solution until equilibrium is reached and both sides are _______ tonic. This specific process of water movement across cell membranes is called _______________.

How does osmosis differ from diffusion? _______________
Balance of water between cells and their surroundings is crucial to life. Water needs to be able to cross freely the cell membranes. Why isn’t it able to cross by itself?

How does it cross the membrane? The reason why water moves across membranes is to release of osmotic pressure created by the difference in the concentrations on the two sides of the membrane. It’s easier to have water balancing out the concentration rather than moving other solutes. Also, water can move freely across the membrane.

In order for plant cells to be healthy, they need to have a concentration of water inside the cell, in order to keep their rigid structure and grow against gravity. Plant cells have adapted to keep this osmotic pressure:

- **Cell wall**
  - Supports and protects the cell by holding the pressure and preventing the cell from excess water uptake and bursting
- **Vacuole**
  - Hold excess water and it pumps it out as needed

Analyze the picture above and complete the following paragraph:

Plant cells can be firm or ______________. This is the __________, healthy state for plant cells, when in a ________________ environment. On the other hand, an animal cell would ________________ and die in this environment, as it has no way to protect from the excess water ________________ that happens through ________________.

When placed in an ________________ environment plant cells become ________________, which leads to plant bending, as there is no pressure inside to keep them turgid. However, this is the preferred environment for the animal cells. Why? ________________
In a __________________________ environment, both animal and plant cells
__________________________, as the water moves_________________________ the cell through the process of_________________________. Animal cells would die. In plant cells this process is called plasmolysis, or the plant cells are______________ (shrink) - this is when the plasma membrane pulls away from the cell wall, as excess water goes out of the cell. The cell wall protects the plant cell from dying right away and they can go back to normal when the concentration of solutes is lowered on the __________________________ of the cell. When this happens, the water will move from a __________________________ solution towards a _
_________________________ solution through the process of _
_________________________.

2). **Active transport** is when molecules cross the cell membranes by moving from low concentration to high concentration____ energy input. Transport proteins actively pump specific small solutes across membrane against their concentration gradient. This can be done with small molecules or with large molecules. For large molecules this type of transport is called

- Endocytosis is – __________________________
  - Phagocytosis is – __________________________
  - Pinocytosis is – ___________ __________________________
- Exocytosis is – __________________________

Endocytosis / Exocytosis

http://highered.mcgraw-hill.com/sites/0072437316/student_view0/chapter6/animations.html#

Cellular Transport !


Cell Membrane Structure
http://www.susanahalpine.com/anim/Life/memb.htm

Osmosis
http://highered.mheducation.com/sites/9834092339/student_view0/chapter38/animation__
Cellular Transport!

Endocytosis / Exocytosis
http://highered.mcgraw-hill.com/sites/0072437316/student_view0/chapter6/animations.html#